AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1. (Currently Amended) A spectrometer for analysing a sample produced by an inductively coupled plasma torch in which a plasma is created in a tube of the spectrometer by application of gas to the torch and activation of an induction coil to heat the gas and therefore produce the plasma, wherein the plasma is constrained within the tube, is separated from the tube and is capable of collapsing into a toroidal plasma, the spectrometer comprising:

a detector for monitoring the plasma; and

a control section for receiving ~~a~~ an output signal from the detector and for determining from said output signal that the plasma has collapsed into the toroidal plasma~~,~~; and

an RF generator for generating power to be applied to the gas with the induction coil in order to heat the gas, wherein the control section is configured to ~~shut down the torch~~ automatically switch off the RF generator and thereby extinguish the plasma when the control section determines that the plasma has collapsed into the toroidal plasma.

2. (Previously Presented) The spectrometer of claim 1 wherein the detector comprises an optical detector which is directed at a position at which the top region or tail of the plasma will exist, so that when the plasma collapses into the toroidal plasma, the light intensity falling on the optical detector falls, thereby changing the signal produced by the optical detector so that the control section can determine that the plasma has collapsed.

3. (Previously Presented) The spectrometer of claim 1, wherein the detector is provided with a collimator and/or a lens for increasing the ratio of light received by the detector when the plasma is in existence, compared to the light received by the detector when the toroidal plasma is in existence.

4. (Previously Presented) The spectrometer of claim 1 comprising an optical fibre or fibres or solid waveguide arranged to conduct light to the detector.

5. (Previously Presented) The spectrometer of claim 3, wherein the detector is a photodiode.

6. (Previously Presented) The spectrometer of claim 1 wherein the detector is an electronic camera with suitable software to analyse the image of the plasma and determine its shape and position to thereby determine if the plasma has collapsed to the toroidal plasma.

7. (Original) The spectrometer of claim 1 wherein the detector is a pixel array.

8. (Original) The spectrometer of claim 7 wherein the array is a linear photodiode array and the linear photodiode array is provided with a lens.

9. (Cancelled).

10. (Previously Presented) The spectrometer of claim 1 wherein the detector is for determining the impedance value of the plasma in order to determine the change from the plasma to the toroidal plasma.

11. (Previously Presented) The spectrometer of claim 10 wherein the induction coil includes a generator for generating power to be supplied to the coil to activate the coil, and the impedance value is provided by measuring the voltage and current of a high voltage DC supply which feeds the generator.

12. (Previously Presented) The spectrometer of claim 1 wherein the detector is a photodiode.

13. (Previously Presented) The spectrometer of claim 2 wherein the detector is a photodiode.

14. (Currently Amended) A method of controlling a plasma torch spectrometer, comprising:

producing a plasma in a tube of the spectrometer by: ~~application of~~ applying gas to an inductively coupled plasma torch; generating power with an RF generator; and ~~activation of an~~ heating the gas to a plasma state by applying the power generated by the RF generator to the gas with the induction coil ~~to heat the gas~~, wherein the plasma is constrained within the tube, is separated from the tube and is capable of collapsing into a toroidal plasma;

a detector detecting a collapse of the plasma into the toroidal plasma;

receiving ~~a~~ an output signal from the detector at a control section;

determining with the control section from the output signal that said plasma has collapsed into the toroidal plasma; and

said control section responding to determining that said plasma has collapsed into the toroidal plasma by ~~shutting down said torch~~automatically switching off the RF generator and thereby extinguishing the plasma.

15. (Currently Amended) The method of claim 14, further comprising:

~~directing~~ arranging said detector ~~at the~~ to monitor a top region or tail of the plasma;

monitoring said plasma with the detector for a fall in light intensity due to the plasma collapsing into the toroidal plasma; and

determining that the plasma has collapsed with said control section from a change in the output signal produced by the detector due to said fall in light intensity, wherein the detector comprises an optical detector.